IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

POLAROID CORPORATION,

    Plaintiff and Counterclaim-Defendant,

    v.

HEWLETT-PACKARD COMPANY,

    Defendant and Counterclaim-Plaintiff.

C.A. No. 06-738 (SLR)

REDACTED

DEFENDANT HEWLETT-PACKARD COMPANY'S
OPENING CLAIM CONSTRUCTION BRIEF

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TABLE OF CONTENTS

TABLE OF CONTENTS (cont'd)

TABLE OF AUTHORITIES

TABLE OF AUTHORITIES

I.   INTRODUCTION

Polaroid has been, historically, a camera company. Not surprisingly, United States Patent No. 4,829,381 ("the '381 patent") is a camera patent. In this case, as exemplified in Polaroid's claim construction positions, Polaroid seeks to broaden its patent to cover Hewlett-Packard's non-camera products, such as printers and software.

Hewlett-Packard seeks to have the '381 patent interpreted as it was meant to be, based on the intrinsic record. Plaintiff Polaroid's constructions, by contrast, seek to impermissibly broaden the patent and are contrary to, and inconsistent with, the claim language, specification, and all other intrinsic evidence. So broad are Polaroid's proposed constructions that, if adopted, they would likely either render the claims of the '381 patent meaningless or broaden the patent to cover embodiments that would render the patent invalid.

For these reasons, as set forth in more detail below, Defendant respectfully requests that the Court adopt Defendant's proposed constructions.

A.   Technical Background

The '381 patent at its most basic level is about pictures, or more particularly, making those pictures look better. The '381 patent concerns the enhancement of digital images and the use of algorithms to manipulate a digital image to emphasize certain features in the image. This enhancement is necessary because the capture and conversion of a natural scene may create problems that render an image unappealing or its details unclear. These problems are a result of the converting a natural, analog scene into a digital image.

1.   How a Digital Image is Created from a Natural Scene

An imaging device, such as a digital camera, captures a scene using an array of sensors. (Joint Appendix, ("J.A."), at 8 ('381, col. 1, ll. 15-20), filed herewith.) Each sensor captures light from a small part of the scene, and then creates a digital value based on the light detected.

These digital values each represent the average brightness in their small part and are called "picture elements" or, more commonly, "pixels." (Rosenfeld and Kak, *Digital Picture Processing*, ("Rosenfeld"), Ex. A at 3.)[1] In an image made up of shades of grey, a pixel can be represented with a single number – the brightness or "luminance" of the picture element.

In color images, pixels are represented in different ways, two of which are relevant for the present case. First, a pixel may represent brightness using "RGB" data, where the pixel has three brightness values, relating to the red (R), green (G) and blue (B) parts of an image. (J.A. at 9 ('381, col. 3, ll. 25-35).) Second, a pixel may represent brightness using what is referred to in the art as "Luminance / Chrominance." Like the RGB system, a Luminance-based representation consists of three sub-parts: Luminance (Y) and two chrominance values. (J.A. at 9 ('381, col. 3, ll. 35-50).) In such a system, the luminance portion of the image is a monochrome representation of the scene's brightness, i.e. one without any color components. The collection of these pixel values, whether represented by RGB data or YCC data, result in a digital image of the natural scene. This raw data, however, often requires further processing to reduce noise or otherwise improve the quality of the image.

2.   Problems with Digital Images.

One problem with digital images is that pixels have a discrete number of brightness levels that may not accurately correspond to the analog scene that was captured. For example, an outdoor scene may contain images with bright sunlight and dark shadow where the brightest value of the scene are substantially brighter than the darkest value of the scene. (J.A. at 8 ('381. col. 1, ll. 33-35).) This difference between the brightest and darkest portions is called the "dynamic range" of the scene. In a real world scene, the dynamic range may be very large, i.e., the brightest part of the scene may be many thousands of times brighter than the darkest part.

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[1] All exhibit citations refer to the accompanying Declaration of William J. Marsden, Jr., unless otherwise noted.

Alternatively, the real world scene may have a small dynamic range: a darkened theater, for example, where the light areas may only be 10 times brighter than the darkest.[2] (*See* J.A. at 8 ('381, col. 1, ll.43-52).) This variable dynamic range of the natural environment poses a certain challenges when the real world scene is captured by an imaging device, such as a digital camera or scanner. (*See, e.g.,* J.A. at 8 ('381, col. 1, ll. 25-45).)

In an 8 bit imaging device, the pixels can range from binary values of "00000000" to "11111111," representing integer values from 0 to 255. These integer values represent the 256 levels of brightness that can be recorded by the digital imaging device. In such a case, the digital dynamic range of the imaging device is 256, ranging from a value of 255 for the brightest portions of the image and a value of zero for the darkest. When a digital imaging device with a fixed dynamic range (of, for example, 8 bits) attempts to represent part of a real world scene, it must do so using only values that range from 0 to 255. If the dynamic range of the real world scene varies by a factor of 5000, (e.g. a nighttime scene with a bright traffic light), the imaging device must attempt to represent the 5000-fold variations of the image within the 256 values that are available to it. Likewise, if a scene contains a very narrow range of luminance, it may need to be expanded out to 256 separate levels of brightness.

3.   Gamma Functions and Other Transformations Used To Compensate for Problems in Image Quality.

In a perfect sensor or display, the output luminance is directly proportional to the input voltage – a voltage of 0.80 results in a luminance of 0.80. (For mathematical convenience, the range of possible voltages and luminances are typically represented with the numbers between 0 and 1 in an analog environment.) This is called a "linear" system and a graph is included below.

However, televisions for example are not linear systems. The amount of light displayed by a television is not proportional to the input signal. Instead, the relationship between input

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[2] The noontime Sahara also has a small dynamic range: everything is very bright.

voltage (**V**) and output luminance (**L**) is an exponential function. Typically, $L = V^{2.2}$. The

exponent 2.2 in this equation is referred to as "gamma", and the effect is a gamma distortion. As

shown below, an input voltage of 0.80 produces a luminance of 0.61, and an input voltage of

0.40 produces a luminance of 0.13.

Linear System   Gamma Distortion (e.g. normal television)
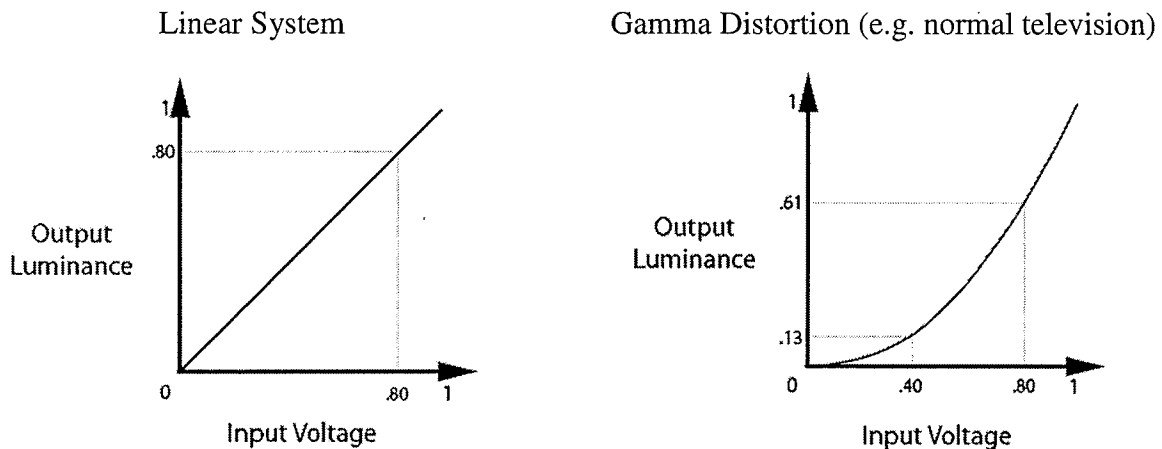
In television, gamma correction is used to "correct" gamma distortion. If a linear system

is desired, the inverse of the distorting gamma can be applied to the input before sending the

signal to the distorted system. For example, if a television has a gamma of 2.2, an engineer

could create a linear system by first applying a gamma of 0.45 (which is 1 / 2.2). As shown

below, the inverse gamma is the opposite of the gamma distortion. When applied, the distortion

inherent in the display is canceled out and a linear relationship is achieved. See below:

(Computer   Graphics

Systems   Development,

Gamma   *Correction*

4
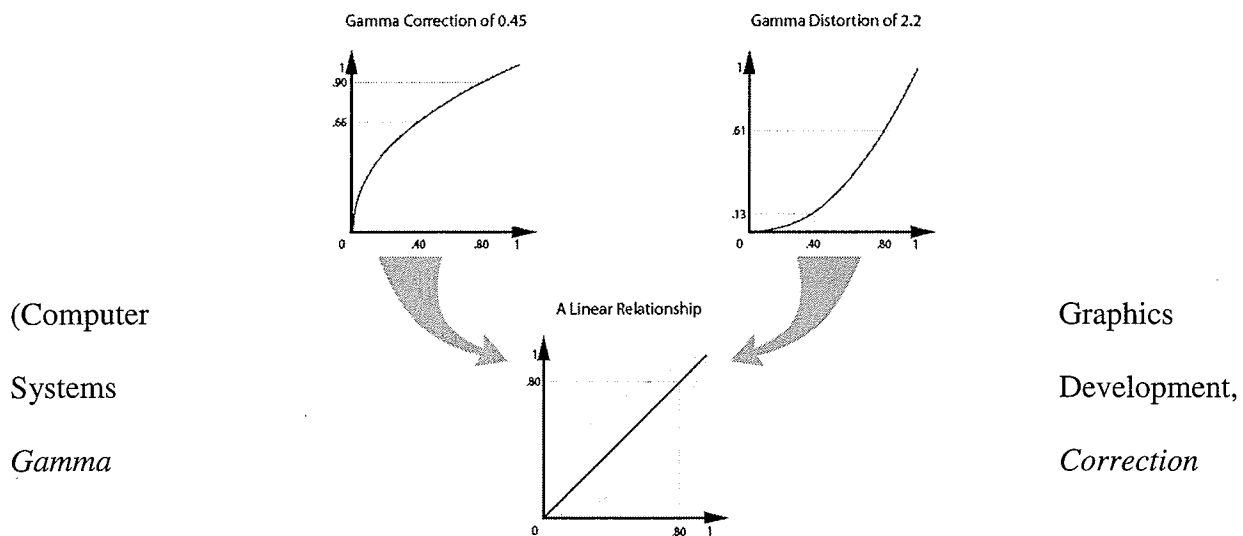
Explained, Ex. B at 1-2; Deposition Transcript of Dr. Donald S. Levinstone, ("Levinstone"), Ex. C at 95).

A method of adjusting luminance levels like that described above is a mathematical function that is known in the art as a "transformation". These functions can either be applied to every pixel as in the gamma correction example above, or different functions can be applied to different areas of the picture. (Rosenfeld, Ex. A at 169-73).

Gamma functions are known in the art for being particularly useful in contrast adjustment. A gamma function with a low exponent stretches the portion of the dynamic range that was previously allocated to the darkest regions. For example, with a gamma exponent of 0.5, the pixels with a luminance between 0 and 0.33 in the input image, will have a luminance between 0 and 0.57 in the output image.
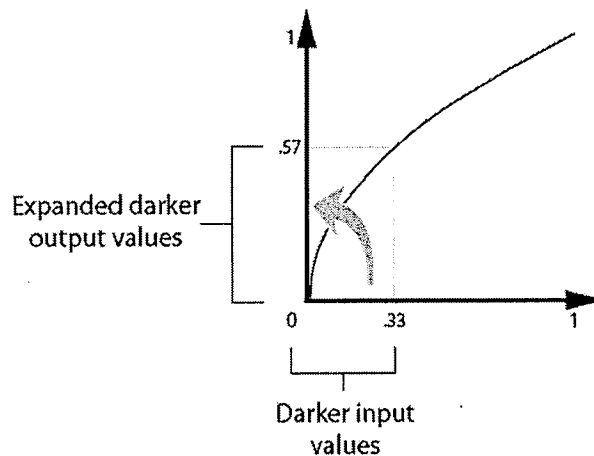
The contrast of these darker regions is enhanced improving visibility in shadows, while the contrast of the corresponding lighter regions is compressed. This property of gamma was well known in the prior art, including in prior art cited in the '381 patent's prosecution history:[3]

> [I]f the over all gamma characteristic is logarithmic [i.e. the exponent is less than 1], the dark picture portions will have expanded contrast, and fine dark

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[3] *See also* Levinstone, Ex. C. at 96; US Pat 4,394,688, Ex. D at 5, (col. 5, ll. 13-19) (cited in Cosh, J.A. at 978).

5

or shadow detail is reproduced. Conversely, if the gamma characteristic is exponential [i.e. the exponent is greater than 1], the bright portions will have expanded contrast, and detail in brightly lit areas will be clear. (J.A. at 93 (Okada, col. 1, l. 65 - col. 2, l. 2); *id.* at 88 (Okada, Fig. 2).)

4.   Averaging

Processing digital images commonly involves computing a local average, often for image sharpening or noise reduction. Two methods are disclosed in the '381 patent and are relevant here: the block average and the low-pass filter. The two algorithms, both well known in the art, (J.A. at 9, ('381, col. 3, l. 61 – col. 4, l. 5)), choose a number of pixels and calculate the average value of those pixels. The two algorithms differ because they select different pixel groups for averaging.

In a block averaging algorithm, the image is divided up into blocks of pixels, and the average is computed from the set of pixels in each block. In the example below, the blocks consist of 9 pixels in a 3 x 3 grid – the average is the sum of those nine pixels divided by 9. The '381 patent discloses that each of the pixels in a block share the same local average, meaning that each pixel is only involved in a single average calculation. (J.A. at 9, ('381, col. 3, l. 67 – col. 4, l. 7).)

Block Averages

The block average for pixel ②① is: $\dfrac{①① + ①② + ... + ③③}{9}$

The same number is the block average for ②②, ③③ and every other pixel in the block

The block average for pixel ①④ and every other pixel in the block is: $\dfrac{①④ + ①⑤ + ①⑥ + ... + ③⑥}{9}$

6
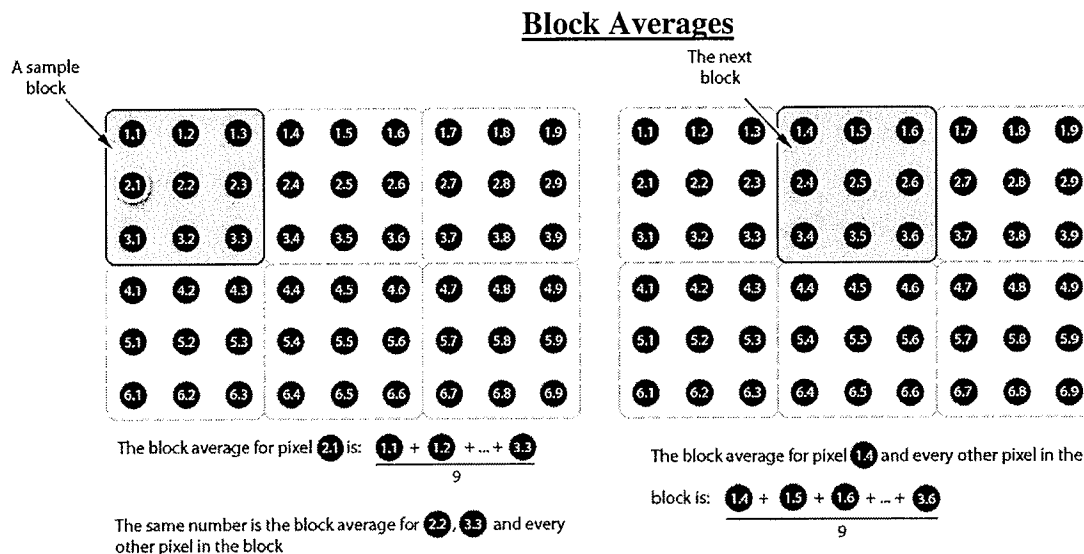
Unlike a block average, a low-pass filter computes a new average for each pixel. The local average for a pixel is computed by averaging that pixel with its neighbors. The low-pass filter takes a selected pixel and all neighboring pixels, then computes the average of that group. It then repeats this operation for the next pixel, and so on for the entire image. A low-pass filter also differs from a block average because the pixels in a low-pass filter are included in multiple local averages: their own local average, plus the local averages of their neighbors. (J.A. at 9, ('381 col. 3, ll. 61-67).)

Low-Pass Filters
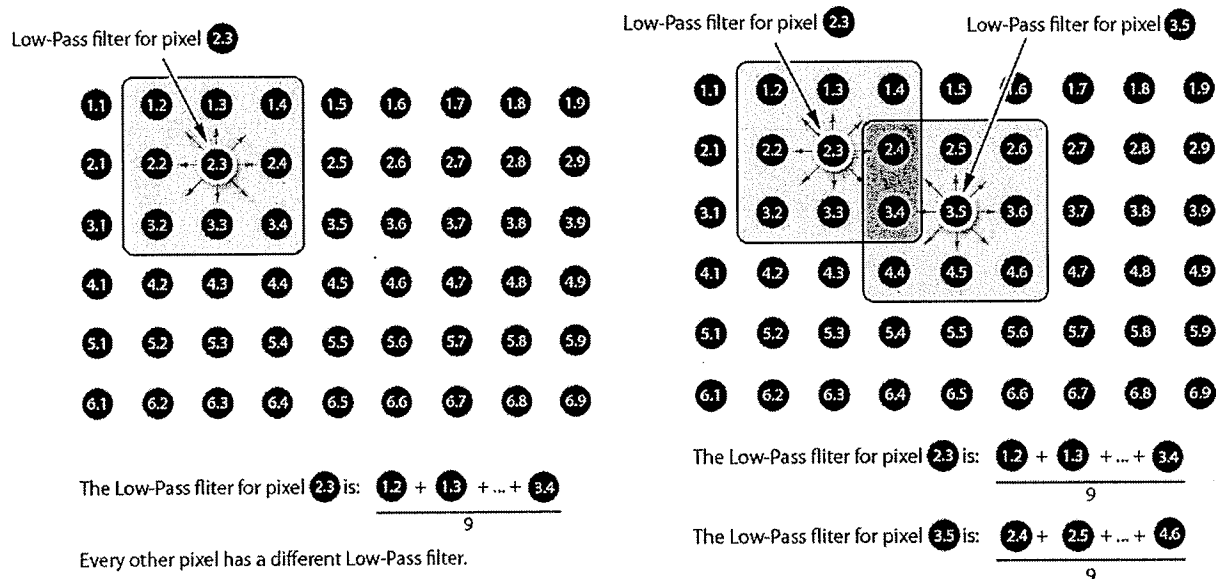
The above example indicates how the average of a given pixel is included in multiple local averages, when the average is calculated using a low-pass filter. As illustrated above, pixels 2,4 and 3,4 are included in the local averages associated to both pixel 2,3 and pixel 3,5.

B.   The '381 Patent and Its Prosecution History.

1.   The '381 Patent.

The heart of Dr. Song's and Dr. Levinstone's idea is using a local averager and specific ratio algorithm to pick gamma functions to enhance an image. Three steps are involved. First,

7

an averager calculates the average luminance value for a set of pixel luminance values. Second, a gamma determining circuit uses the average value calculated in a ratio algorithm to set a gamma value. Third, a transfer function imposing circuit uses the gamma to transform the luminance value of each input pixel. Of particular importance is that the same data that is averaged is also transformed. There is no disclosure of transforming signals other than those that were averaged.

a.   Calculating a Local Average Luminance

Before the average can be calculated, a luminance value must be extracted from the color image for each pixel. For example, RGB Data captured by the image sensors is immediately subject to gain control and the luminance ("Y") is calculated according to the formula $Y = 0.39R + 0.59G + 0.11B$. (J.A. at 9, ('381, col. 3, ll. 40-56).) Averaging and transforming are performed only on this luminance "Y" portion of the image pixels. (*See* J.A. at 6-7 ('381, Figs. 1 & 4).) There is no disclosure of what, if anything, is done to the two "chrominance" portions of the image for particular pixels.[4]

These luminance values are then averaged using a block average. As is discussed in more detail below, although a low-pass filter is disclosed in the specification, the claims were written to describe only the use of a block average.

b.   Choosing a Gamma Function

The average is then used to choose a gamma function for the pixels involved in the average. (J.A. at 9 ('381, col. 4, ll. 26-33).) As noted above, a gamma function increases contrast in the light areas when the gamma exponent is below 1, and increases contrast in the dark areas when the gamma exponent is above 1. In the '381 patent, the average value (a

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[4] In fact, the '381 patent does not even disclose structure for computing the two chrominance values for pixels in the image, nor any use for the chrominance signals.

number between 0 and 255) is divided by 128 minus 1, producing a value between 0 and 2.[5] (*Id.* ('381, col. 4, ll. 26-39).) The result of this calculation is then used, in part, to determine the value of gamma. *Id.*

This method of converting a number between 0 and 255 (i.e. the average value) into a number between 0 and 2 is important because this "ratio" limitation was added to overcome the USPTO's obviousness rejection, as described below. Consequently, the calculation of this ratio is the central limitation of the '381 patent.

c.   Applying the Gamma Transfer Function

Lastly, the gamma function is applied to relevant pixel(s). (J.A. at 9 ('381, col. 4, ll. 56-62.) In dark areas, the contrast of dark pixels is enhanced. Similarly, in light areas, the contrast of light pixels is enhanced. Consequently, the overall contrast in various regions of the image is improved.

2.   The Prosecution History

The prosecution history of the '381 patent is brief. In fact, there was only a single office action prior to the examiner allowing the claims of the patent to issue. The rejections of the examiner and the patentee's response to overcome them, however, are critical to understanding the proper scope of the invention claimed by the '381 patent.

The examiner rejected every claim of the original application. First, the examiner found the dependent claims indefinite because several terms lacked an antecedent basis. (J.A. at 48.) Specifically, the examiner found that there was no antecedent basis for seven terms found in the dependent claims, including "the ratio", "the value", "the dynamic range" "the logarithm", "the antilogarithm", "the maximum value", and "the amount." Second, the examiner found the independent claims obvious over Okada, U.S. Patent No. 4,489,349. (J.A. at 49.) The examiner

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[5] This number is subsequently massaged to typically produce a value between ½ and 2.

found that Okada rendered the filed claims obvious because "[b]oth systems show an averaging circuit and a correction circuit which used the averaged information to produce an output which follows the slopes of the curves shown in Figure 2 of the present invention and Figure 2 of Okada."
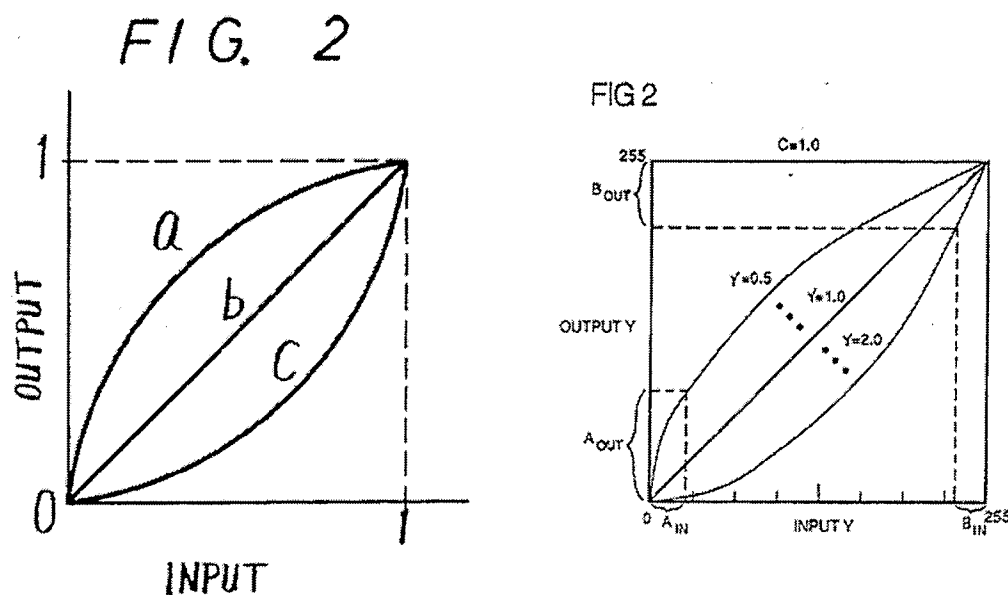
(*Compare* Fig. 2 of U.S. Patent 4,489,349 (J.A. at 88 (Okada)) *with* Fig. 2 of the '381 patent (J.A. at 6).)

In addition, the examiner found that Okada rendered the filed claims obvious as Okada disclosed a "brightness control circuit having an average picture level detector 20 which averages input picture information and provides a control signal to a variable correction circuit 10." (J.A. at 49.) This variable correction circuit, in turn, "operates on the input-output signal to vary the characteristic of the input-output signal as a function of the detected average picture level detector (see Fig. 2)." (*Id.*) Finally, Okada disclosed the control of "relative brightness of the video signal such that the picture areas containing most of the picture information are corrected to give greater contrast." (*Id.*)

10

In its response to this office action, the patentee added the phrase "each signal having a value within a determinate dynamic range of values" to the preambles of claims 1 and 7.[6] (J.A. at 53 & 56-57, respectively). The patentee explained that these amendments were necessary to "obviate[e] the Examiner's rejection based on a lack of antecedent basis for these terms." (J.A. at 58-59.) Also, in response to the examiner's obviousness rejections, the patentee further amended the original independent claims to include an additional limitation that included the following phrase: "wherein said transfer function is selected further as a function of the ratio of the value of the average electronic information signal to a select proportionate value of the dynamic range…". (*See* J.A. at 54 & 57.) This amendment was necessary to overcome the obviousness rejection in light of Okada. Without the language relating to the ratio, the patentee was merely claiming the general slope of the function described by Okada, a claim that was rejected by the examiner.

II.   THE LAW OF CLAIM CONSTRUCTION

A.   Generally

In claim construction, "[t]he construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1316 (Fed. Cir. 2005) (*en banc*). As such, the specification "is the single best guide to the meaning of a disputed term." *Id.* at 1315 (internal quotations and citations omitted). The importance of the specification derives from the statutory mandate that an inventor "provide a 'full' and 'exact' description of the claimed invention." *Id.* at 1316. Nevertheless, the specification is not the only source that provides guidance in the course of claim construction. Like the specification, the prosecution history "inform[s] the meaning of the claim language by demonstrating how the inventor understood the

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[6]   The claim numbers refer to the claims as issued in the '381 patent.

11

invention and whether the inventor limited the invention in the course of prosecution, making the claim construction narrower than it otherwise would be." *Id.* at 1317. Additionally, the court may rely on extrinsic evidence but it should be "considered in the context of the intrinsic evidence." *Id.* at 1319.

B.   Means-Plus-Function Claims

The '381 patent includes means-plus-function claim language. Section 112, ¶ 6 states that means-plus-function limitations "shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof." 35 U.S.C. § 112 ¶ 6. The presence of the word "means" in a claim term creates a rebuttable presumption that the limitation should be construed under 35 U.S.C. § 112 ¶ 6. *Cole v. Kimberly-Clark Corp.*, 102 F.3d 524, 530-31 (Fed. Cir. 1996). In construing means-plus function limitations, the Court must first identify the claimed function, and then identify the corresponding structure in the specification. *Biomedino, LLC v. Waters Techs. Corp.*, 490 F.3d 946, 950 (Fed. Cir. 2007). But, the "structure disclosed in the specification is 'corresponding' structure only if the specification or prosecution history links or associates that structure to its function." *B. Braun Med., Inc. v. Abbott Labs.*, 124 F.3d 1419, 1424 (Fed. Cir. 1997).

C.   Preamble

A preamble is limiting on the claim if "the claim cannot be read independently of the preamble and the preamble must be read to give meaning to the claim or is essential to point out the invention." *Porter v. Farmers Supply Serv., Inc.*, 790 F.2d 882, 885, (Fed. Cir. 1986). In particular, a preamble is limiting when it contains definitions that serve as an antecedent basis for terms used in the body of the claims. *Electro Scientific Indus., Inc. v. Dynamic Details, Inc*, 307 F.3d 1343, 1348 (Fed. Cir. 2002).

III.   HEWLETT-PACKARD'S PROPOSED CONSTRUCTIONS

The parties have asked the Court to construe a number of terms relating to claims 1 and 7 of the '381 patent—the only independent claims asserted in this litigation—as well as dependent claims 2-3 and 8-9. The number of terms at issue in this case is dictated by the form that the patentee elected to claim his invention. While claim 7 is a method claim, claim 1 is a means-plus-function claim that requires the Court to construe two separate functions as well as their corresponding structures.

A.   The Preamble And Its Terms Are Limiting

Prior to undertaking the construction of the claims, the Court must determine whether the preambles of independent claims 1 and 7 act as limitations of the claims. Hewlett-Packard contends that applicable law requires a finding that the preambles limit the claims.

First, the preambles of independent claims 1 and 7 define a number of terms that are referred to later in the claim, including "electronic information signals" and "dynamic range". The law is settled that a preamble acts as a claim limitation when it provides an antecedent basis for terms used in the body of the claim. *Electro Scientific Indus.*, 307 F.3d at 1348. For both of these terms, the inclusion in the preamble was necessary to provide an antecedent basis and they are properly considered limitations of the claim.

For other terms, the specification makes clear that the terms are necessary to breathe life and meaning into the claims, including "continuously enhancing", "electronic image data received in a continuous stream of electronic information signals" and "each signal having a value within a determinate dynamic range of values." *See Poly-Am., L.P. v. GSE Lining Tech., Inc.*, 383 F.3d 1303, 1310 (Fed. Cir. 2004) (noting that "when reciting additional structure or steps underscored as important by the specification, the preamble may operate as a claim

13

limitation") (quoting *Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002)).

As each of the preamble terms for which Hewlett-Packard seeks construction provides crucial context to, and is necessary to explain the meaning of the claims, the Court should construe the terms as set forth below.

B.   "Continuously enhancing. . . ." (claims 1,7)

Claim Term	HP Proposed Constr.	Polaroid Proposed Constr.
A system/method for **continuously enhancing**	successively transforming	successively transforming
Support for HP Position: Preamble limitation that describes how the "transforming" means/ step is accomplished.		
Why Polaroid Position is Incorrect: The preamble provides further meaning to the term "transforming" that is in the body of the claim.		

Polaroid and Hewlett-Packard agree on the construction of "continuously enhancing." The only dispute regarding this term is whether it should be construed at all. Polaroid maintains that the term does not need to be construed because it is found in the preamble. The term "continuously enhancing," however, is not only found in the preamble, but is used throughout the patent. (*See* J.A. at 5 ('381 at Abs.) (defining the claimed invention as "[a] system and method . . . for continuously enhancing electronic image data"); J.A. at 8 ('381, col. 2, ll. 63-65) (noting that "the system and method of this invention operates to continuously enhance electronic image data"); *see also* J.A. at 10 ('381 col. 5, ll. 8-15) (noting that "gamma γ changes continuously . . . . so that each image defining luminance electronic information signal is enhanced . . . ."). The specification is, in fact, replete with references to the importance of "continuously enhancing" and, as such, the term cannot be ignored when it appears in the preamble. *See Poly-Am., L.P. v. GSE Lining Tech., Inc.*, 383 F.3d 1303, 1310 (Fed. Cir. 2004) (noting that "when reciting additional structure or steps underscored as important by the

specification, the preamble may operate as a claim limitation") (quoting *Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002)).

Further, the term is limiting because it provides information as to how the "transformation means" (claim 1) and "transforming" method (claim 7) are accomplished. See Porter v. Farmers Supply Serv., Inc., 790 F.2d 882, 885, (Fed. Cir. 1986) (A preamble is limiting if "the claim cannot be read independently of the preamble and the preamble must be read to give meaning to the claim or is essential to point out the invention."); see also Biacore v. Thermo Bioanalysis Corp., 79 F. Supp. 2d 422, 457 (D. Del. 1999) (Robinson, J.) (finding the preamble limiting where the phrase in the preamble "informs the construction of the remainder of the claims"). The term "continuous" serves to provide a further limitation in that the "transforming" is continuous - that is successively transforming. The patent states: "[t]oward that end, the system and method of this invention operates to continuously enhance the electronic image signal received in a continuous stream of electronic information signals. . . ." (J.A. at 8 ('381, col. 2, ll. 62-65).) Dictionaries commonly define continuous as "uninterrupted in time, sequence or essence; going on without interruption", "without interruption of substance" and Hewlett-Packard offers the same construction. (The Oxford English Dictionary, ("OED"), Ex. E at 830).

The combination of "continuously enhancing" with a transforming step (claim 7) or a transforming means (claim 1) indicates how the image is enhanced. Because this term is critical to the invention described in the specification and must modify the term "transforming" found later in the claims, this claim term should be construed. *See Biacore*, 79 F. Supp. 2d at 457.

C.   **"Electronic Information Signals" and "Electronic Image Data Received in a Continuous Stream" (Claims 1 and 7)**

"Electronic information signals" is a term that is found in the preamble, and the parties do not dispute that this term requires construction. Nevertheless, the parties disagree on three

15

meaningful points in their constructions of "electronic information signals" (claim 7) and "electronic image data received in a continuous stream of electronic signals." (claim 1). First, Hewlett-Packard proposes a construction limiting electronic information signals to luminance data, consistent with the only disclosed usage. Polaroid seeks an unsupported but broader construction, including color and chrominance values, which are not described as part of the invention in the specification. Second, Hewlett-Packard construes the claim so the "continuous" stream is "uninterrupted", whereas Polaroid ignores the ordinary meaning of the term and, instead, argues the term merely means a "successive series of signals". Third, Hewlett-Packard argues that the image data must constitute "an original image to be recorded" in contrast to Polaroid's mere "pixel information" construction.

1.   "Electronic Information Signals" Mean Luminance Signals.

Claim Term	HP Proposed Constr.	Polaroid Proposed Constr.
electronic information signals	signal(s) providing luminance pixel information	signals providing pixel information, such as color, luminance, or chrominance values
Support for HP Position: The '381 disclosure indicates that Luminance (Y) is the only electronic information signal which is ever transformed and averaged, each of which is recited later in the claim.		
Why Polaroid Position is Incorrect: Broadly encompasses "color" and "chrominance" values which is beyond the disclosure of the patent.		

According to the claims at issue in this litigation, the "electronic information signals" are subject to an "averaging means" (claim 1) or the step of "averaging" (claim 7), as well as a "transforming means" (claim 1) or the step of "transforming" (claim 7). The only type of signals disclosed in the patent specification that are subject to the claimed steps and means are lumenance signals. (*See generally, e.g.,* J.A. at 9 ('381, col. 4, l. 56-col. 5, l. 3) (noting that Y_{out} is the imaging defining luminance electronic information signal transformed in the manner of this invention by "transfer function imposing circuit 16").) This is made clear in Figures 1, 2, and 4, which show luminance "Y" being the input to averager 12 and being transformed in box 16.

FIG 1

CONTROL PARAMETER
C

10

12

Y_{INPUT} ──► AVERAGER ──► A_V ──► $Y' = (1+C)^{(A_V/M-1)}$ ── 14

Y'

16

$Y_{OUT} = Y_{MAX}(Y_{IN}/Y_{MAX})^{Y'}$ ──► Y_{OUTPUT}
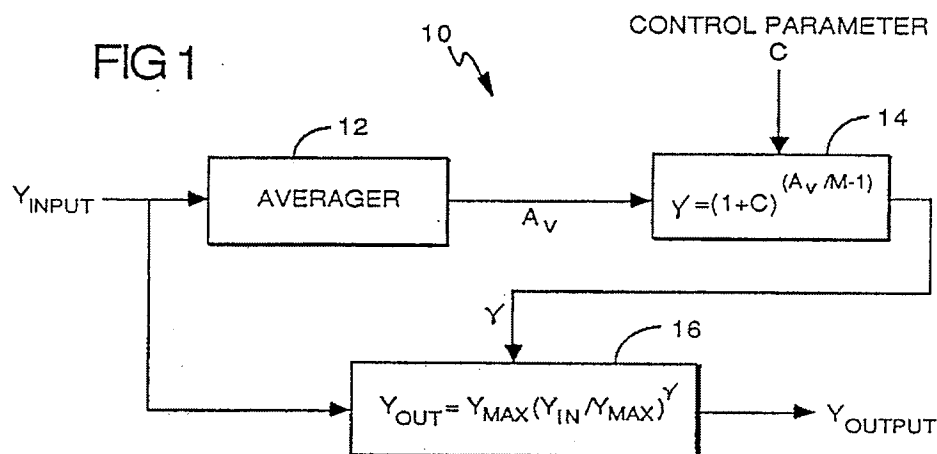
The claimed "electronic information signals" are signals representing the luminance of

the image, received from an input device such as a CCD array. As the specification makes clear:

> The electronic information signal values retrieved from the
> photosensitive array in this manner are preferably converted to
> luminance (Y) and chrominance, e.g., (R-Y and B-Y) signal
> values. For the case where the two-dimensional photosensitive
> array is overlayed with red, green and blue filters, *the luminance
> electronic information signals are preferably determined by the
> following relationship*: $Y=0.30R+0.59G+0.11B$ as is well known
> in the television art

(J.A. at 9 ('381, col. 3, ll. 35-43) (emphasis added).)

> The value of gamma is thereafter directed to a transfer function
> imposing circuit 16 which operates to impose the following
> transfer function on the *image defining luminance electronic
> information signals (Y)* . . . .

(J.A. at 9 ('381, col. 4, ll. 56-59) (emphasis added).)

> Y_{out} equals the image defining luminance electronic information
> signal transformed in the manner of this invention to provide an
> enhanced image.

(J.A. at 9 ('381, col. 4, l. 67-col. 5, l. 3).)

As stated above, the patent specification, including Figures 1, 2 and 4, follow the well

known convention of representing "luminance" using the variable "Y." (J.A. at 9 ('381, col. 3,

17

REDACTED

l. 37).

Consequently, the term should be construed in accordance with its use in the specification. *See Phillips*, 415 F.3d at 1315.

Polaroid's construction of "electronic information signals" is contrary to the specification, because it allows for "*color*, luminance, or *chrominance* values." (J.A. at 9 ('381, col. 3, ll. 59-60) ("The image defining <u>luminance</u> electronic information signals…").) The specification does not disclose either averaging or transforming color (R,G,B) or chrominance values (C1, C2), and Polaroid should be precluded from urging a construction that encompasses an invention that is neither enabled nor described in the written description. *LizardTech, Inc. v. Earth Resource Mapping, Inc.*, 424 F.3d 1336, 1345-46 (Fed. Cir. 2005).

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[7]   The Federal Circuit has relied on inventor testimony to determine what is claimed by the patented invention. *See Automotive Techs. Int'l, Inc. v. BMW of N. Am., Inc.*, 501 F.3d 1274, 1283 (Fed. Cir. 2007) (relying on testimony of co-inventor in interpreting the specification).

2.   Electronic image data received in a continuous stream of electronic information signals

Claim Term	HP Proposed Constr.	Polaroid Proposed Constr.
electronic image data received in a continuous stream of electronic information signals	an uninterrupted stream of received luminance image data [pixels] defining an original image to be recorded	electronic data received in a successive series of signals providing pixel information, such as color, luminance, or chrominance values
Support for HP Position: The plain meaning of "continuous" means not interrupted, and the specification indicates that the processing is of an original image to be recorded. **Why Polaroid Position is Incorrect:** Broadly encompasses "color" and "chrominance" values which is beyond the disclosure of the patent; not limited to original images to be recorded.		

The construction of the term "electronic image data received in a continuous stream of electronic information signals" can be divided into two distinct disputes between the parties. First, the parties dispute the meaning of "continuous." Second, the parties dispute how the "electronic image data" is "received."

a.   Hewlett-Packard's Proposed Construction of "Continuous" Properly Relies on the Plain and Ordinary Meaning of Continuous.

In the context of a stream of signals, the plain meaning of continuous is "uninterrupted." (OED, Ex. E at 830). As such, Hewlett-Packard has adopted this plain meaning as part of its construction for the phrase "electronic image data received in a continuous stream of electronic information signals." Polaroid's proposed "successive" construction on the other hand, fails to add any meaning, as everything in a "stream" would already be successive. A "continuous" stream is a stream where there is no interruption to the data within the stream.

b.   Hewlett-Packard's Proposed Construction Regarding How the "Electronic Image Data is Received" Comports with the Specification.

Polaroid's proposed construction also fails because it attempts to broaden the scope of the patent claims to include subject matter that was not disclosed by the '381 patent. The Court should reject Polaroid's improper attempt to broaden the scope of the claimed invention through claim construction. *See Netword, LLC v. Centraal Corp.*, 242 F.3d 1347, 1352 (Fed. Cir. 2001)

19

REDACTED

("The role [of claim construction] is neither to limit nor to broaden the claims, but to define, as a

matter of law, the invention that has been patented.") The specification indicates that the input

luminance signals are "received" from an imaging device that has captured data relating to a

scene in the real world, such as a CCD array that captures image data in a digital camera. For

example, in the Summary of the Invention, the patentee states that his invention is:

> A system is provided for enhancing electronic image data received in a
> continuous stream of electronic information signals wherein each signal
> corresponds to one of a plurality of succeeding pixels. The pixels
> collectively define an image to be recorded.

(J.A. at 8 ('381, col. 1, l. 65-col. 2, l. 5) (emphasis added).)

Later, in the specification, the patentee reiterates that the invention is one that receives

data from an imaging device, as follows:

> The electronic information signals input at terminal Y_{input} may be derived in
> a well-known manner by a two-dimensional photosensitive array or sensor
> (not shown) which may comprise a high resolution charge coupled device
> (CCD) or charge injection device (CID). The sensor receives image scene
> light in any well-known manner by way of an objective lens and shutter
> (also not shown).

(J.A. at 9 ('381, col. 3, ll. 6-13).)

Toward that end, the specification citations above indicate that the system and method of

this invention operates to receive an original image from an originally sensed scene that is to be

recorded, as opposed to an existing image on a computer hard drive that has already been

recorded. Again, the specification makes clear that this is the only reasonable interpretation

when it describes the nature of the problem to be solved by the claimed invention. For example,

the specification states:

> Difficulties arise, however, as a result of differences between the wide dynamic
> range of the scene originally sensed and recorded and the substantially smaller
> dynamic range to which a photographic print may be exposed. The wide dynamic
> range of luminance intensities within the scene originally recorded may thus be
> compressed or clipped to the substantially smaller dynamic range of the
> photographic print, losing detail within certain portions of the dynamic range that
> were otherwise visible in the original scene. Thus, it may be desirable to
> transform the original image defining electronic information signals in a nonlinear
> manner to selectively increase and/or decrease the contrast and brightness in
> certain portions of the scene such as those that might be brightly lit by sunlight or
> underlit as a result of shadows.

(J.A. at 8 ('381, col. 1, ll. 26-40) (emphasis added).)

This confirms that the inventors wanted to alter the image as originally sensed from the

real world prior to recording them in the digital imaging device.

Polaroid's "pixel information" construction is incorrect because it does not indicate that

the signals represent an image to be recorded, perhaps indicating that an already-recorded and

processed image would fall within the scope of its construction. This is also not supported by the

specification or written description as it attempts to expand the invention beyond a camera or

other image capture device, the application for which Polaroid created the invention. Polaroid's

construction does not even include the idea of an image, effectively vitiating the entire limitation.

The construction cannot be correct.

D.   "Each signal having a value within a determinate dynamic range of values" (claims 1,7)

Claim Term	Claims	HP Proposed Constr.	Polaroid Proposed Constr.
each signal having a value within a determinate dynamic range of values	1, 7	each received pixel has an associated luminance value that lies within a predetermined group of luminance values	each signal being associated with a value that lies within a range of possible values bounded by definite limits
Support for HP Position: Supported by specification			

21

Why Polaroid Position is Incorrect: Leads to infinite possibilities and is not disclosed.

This preamble term is limiting because "dynamic range" is recited further in the body of claims 1 and 7 and thus the use of the term in the preamble provides the antecedent basis for the claim term as described above. *See Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 952-53 (Fed. Cir. 2006) (finding the preamble limiting because the terms in the body of the claim "derive their antecedent basis from the preamble); *see also ABB Automation Inc. v. Schlumberger Res. Mgmt. Servs., Inc.*, 254 F. Supp. 2d 475, 477 (D. Del. 2003) (Robinson, J.) (finding that, where term in preamble provided antecedent basis for term later in claim, argument that preamble was not limiting "has no merit"). Moreover, the prosecution history also supports this conclusion. The original claims were rejected by the patent examiner as being indefinite under 35 U.S.C. § 112 ¶ 2 due to a lack of an antecedent basis for a number of claim terms. (J.A. at 48.) In response to this rejection, Polaroid amended the preamble to provide the necessary antecedent basis noting that "[c]laims 1, 7 and 8 have also been amended to recite that the signals have values within a determinate dynamic range thereby obviating the Examiner's rejections based on lack of antecedent basis for these terms." (J.A. at 58-59.) Not only does the preamble define, and therefore limit, but Polaroid should be estopped from arguing to the contrary in light of its actions during prosecution.

The principal difference between the parties' constructions is that Hewlett-Packard's construction limits the range of possible pixel values to a predetermined group. In the 8-bit context, the group of values would consist of the integers ranging from 0 to 255, inclusive for 256 distinct values. Polaroid's construction permits the pixel to take any value within its boundaries. In the 8-bit context, Polaroid's pixels could be non-integers or any other "possible value" between 0 and 255. Polaroid's construction would lead to an absurd result, an unlimited

dynamic range, because there are an infinite number of possible fractional numbers between 0 and 255.

The patent's plain language indicates that the luminance signals[8] must have a value that is within a "determinate" (known) specific number of values. This indicates that the overall range of values is a known set that cannot be departed from.

The specification so states:

> The analog luminance electronic information signal values for each pixel element of the photosensitive array for the example herein described are digitized to an 8-bit binary number so as to have a dynamic integer range of from 0 - 255 within which range are 256 intensity levels and a maximum luminance value of $Y_{MAX} = 255$.

(J.A. at 9 ('381, col. 3, ll. 43-51).)

In light of this clear statement in the specification, Polaroid's construction is incorrect because it defines a value within the dynamic range to be "a value that lies within a range of possible values" which would allow for values outside the dynamic range to be valid. For example, the patent states that for an 8-bit system there are 256 values. The lowest value is 0, the next lowest is 1, and the maximum value is 255. Polaroid's construction would appear to allow a value of 250.5 to be within the dynamic range, even though it is impossible to represent 250.5 in an 8-bit system and even though it would actually provide an infinite number of values. Polaroid's construction also ignores the very purpose of the claimed invention, namely to compensate for the limited number of values in a digital system as opposed to the infinite range of values available in the real world.

E.   "Averaging" Claim Terms

   1.   "Averaging" (claims 1, 7) **/ "Average"** (claims 1, 2, 7, 8)

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[8] The term "each signal" refers to the "electronic information signals" and the only signal that is disclosed is the luminance signal: "Y_{MAX} equals the highest value of the dynamic range for the electronic information signals or 255 for the example herein described. Y_{out} equals the image defining luminance electronic information signal transformed in the manner of this invention to provide an enhanced image." (J.A. at 9-10 ('381, col. 4, l. 66 – col. 5, l. 3).)

Claim Term	HP Proposed Constr.	Polaroid Proposed Constr.
averaging	taking an arithmetic mean of	calculating an intermediate value for
average	an arithmetic mean	of calculated intermediate value
average electronic information signal	*No construction necessary.* Alternatively: the average of the electronic information signals.	signal providing pixel information, such as a color, luminance, or chrominance value of calculated intermediate value

Support for HP Position: Plain language and ordinary meaning.

Why Polaroid Position is Incorrect: Polaroid's construction would encompass almost any mathematical operation, including those unrelated to averaging.

Within the '381 patent's specification, there is no definition of "average" or "averaging" other than a block average (average of a block) or low pass filter average (pixel-by-pixel average). The term "average" is not defined and should be given its plain meaning. Using its plain meaning, an "average" of a set of numbers is determined by adding up all the numbers and dividing the result by the number of numbers you added up. This is an "arithmetic mean." (*See* Lial and Hornby, *Intermediate Algebra*, Ex. F at 701 ("The arithmetic mean, or average, of a group of numbers… is found by dividing the sum of the numbers by the number of numbers.").) This is a case where the ordinary meaning of claim language is readily apparent "and claim construction requires little more than the application of the widely accepted meaning of commonly understood words." *See Phillips*, 415 F.3d at 1314.

Polaroid's construction of "an intermediate value" has no support in the specification and is broad enough to include operations that do not involve the commonly understood meaning of averaging. For example, the median of a group of numbers is an "intermediate value", but it is not an average; the square root of a sum of numbers is an intermediate value, but not an average. Polaroid's construction essentially erases the term "average" from the claim in favor of nearly any mathematical operation and is, therefore, wrong.

2.   **"Means for Averaging . . . and Providing an average"** (claim 1)

Claim Term	HP Proposed Constr.	Polaroid Proposed Constr.
means for averaging	**Function:** providing an average	**Function:** averaging electronic

electronic information signals corresponding to selected pluralities of pixels and providing an average electronic information signal for each said plurality of pixels so averaged	for selected pixel values around one pixel, where the average is correlated to each pixel making up the average. **Disclosed Structure**: a block averager 12 with a buffer memory that takes luminance as an input and outputs an average luminance value that is correlated to each pixel in the block, and equivalents thereof.	information signals corresponding to selected pluralities of pixels and providing an average electronic information signal for each said plurality of pixels so averaged. **Disclosed Structure:** a low pass filter or block average and equivalents thereof.

Support for HP Position: Averaging disclosed col. 3:61- col. 4:25. Only one type of average, the "block" average, has an average associated with each pixel in the plurality of pixels averaged. A buffer memory is always required (col. 4, ll. 8-9). The disclosed averager operates on the luminance. Figs. 2, 4 & col. 4, ll. 25-30.

Why Polaroid Position is Incorrect: The claim language excludes the "low pass filter" embodiment and Polaroid's construction of "averaging" as "calculating an intermediate value for" erases the "averaging" limitations.

The parties agree that this phrase is subject to a "means plus function" claim construction pursuant to 35 U.S.C. 112 ¶ 6. Accordingly, the Court must evaluate the claimed function and construe the claim as limited to the disclosed structure that clearly performs the identified function and equivalents. *Cardiac Pacemakers, Inc. v. St. Jude Med., Inc.*, 296 F.3d 1106, 1113 (Fed. Cir 2002) ("In order to qualify as corresponding, the structure must not only perform the claimed function, but the specification *must clearly associate* the structure with performance of the function." (emphasis added))

> The function is precisely stated:
>
> averaging electronic information signals corresponding to selected pluralities of pixels and providing *an* average electronic information signal *for each said plurality of pixels* so averaged;
>
> (J.A. at 11 ('381, claim 1) (emphasis added).)
>
> Like the function of the asserted claim, the means are clear in the specification. There are

only two methods of "averaging" disclosed in the '381 patent's specification- a "block average" and a "low-pass filter." However, although both a "block average" and the calculation of an

average through the use of a low-pass filter are disclosed in the specification, only a block average can be used in light of the entire claim.

In a block average, as noted above, each pixel is only included in the average of its block. This makes block averaging computationally easier, since averaging happens one time a group of pixels inside the block. (J.A. at 9 ('381, col. 4, ll. 15-20).) For a block average of 4x4 pixel sized blocks, one average is associated with all 16 pixels. A low-pass filter uses a moving window, so a new average must be computed for every single pixel, which requires additional computational capacity as compared to a block average, but is more accurate. (*See id.*) For a 4x4 pixel low-pass filter, 16 averages are computed.

The claim language recites "an" "average electronic information signal for each said plurality of pixels so averaged" and must be read in the context of the entire claim. *Phillips*, 415 F.3d at 1314 ("[T]he context in which a term is used in the asserted claim can be highly instructive"). Later in the claim, the claim language requires that a transfer function "is selected as a function of the electronic information signal for one pixel and the average electronic information signal for the select plurality of pixels containing said one pixel." Taken in combination, this language requires that each pixel be contained in **only one** of the "select plurality of pixels" averaged by the system. A low-pass filter does not have this property, and therefore is not encompassed by the claim language and the structure should be limited to a block average.

In addition to the block average, the structure must also include a buffer memory because, in order to average a group of values, one needs a device that can hold the values as they arrive so that the performed function can be performed on this stored set of values. The specification supports this additional structure: "Both low pass filtering and block averaging require a *buffer memory* to hold the selected groupings of pixel values. . . ." (J.A. at 9 ('381, col. 4, ll. 8-10 (emphasis added)).)

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Finally, the structure must be a structure that receives luminance values and averages these values. In the specification, the only signals shown entering averager 12 are Y (luminance) signals, and there is no disclosure of averaging any other kind of signals. (*See generally* J.A. at 6 ('381, Fig. 1).)

Given the specification and the testimony of the inventor, it is clear that luminance signals are the only signals that are averaged by the averager 12. (J.A. at 6 ('381, Fig. 1); *see* J.A. at 9 ('381, col. 3., ll.59-61) ("The image defining luminance electronic information signals

are thereafter averaged . . . by an averager 12".).) It is improper to construe a claim to cover

embodiments that are not disclosed, and allowing any signals other than luminance signals in

averager 12 would violate this rule. *LizardTech*, 424 F.3d at 1345-46. For these reasons,

Hewlett-Packard's proposed construction should be adopted by the Court.

F.   "Selecting" (claim 7)

Claim Term	HP Proposed Constr.	Polaroid Proposed Constr.
Selecting one of a plurality of different transfer functions for the electronic information signal for each of the plurality of succeeding pixels in a manner whereby each transfer function is selected as a function of the electronic information signal for one pixel and the average electronic information signal for the select plurality of pixels containing said one pixel. .	**each input pixel has an associated transfer function out of different transfer functions, and the transfer function is selected based on the input pixel value, and the average that was formed using the input pixel value, where each input pixel is part of only one average.**	selecting one of a plurality of different transfer functions for the **signal providing pixel information, such as a color, luminance, or chrominance value** for each of the plurality of succeeding pixels in a manner whereby each transfer function is selected as a function of the **signal providing pixel information, such as a color, luminance, or chrominance value** for one pixel and the **calculated intermediate value** for the select plurality of pixels containing said one pixel
Support for HP Position: The plain language of the claim and specification. **Why Polaroid Position is Incorrect:** Polaroid's construction is inconsistent with the specification.		

The construction of the claim 7 step of "selecting" should be governed by the plain

meaning of the words used in the claim language.

The phrase "selecting one of a plurality of different transfer functions for the electronic

information signal for each of the plurality of succeeding pixels. . . ." means that each input

pixel has an associated transfer function out of different transfer functions. This is shown in

Figure 2, which identifies a number of transfer functions based on different values of gamma.

The next phrase "in a manner whereby each transfer function is selected as a function of

the electronic information signal for one pixel and the average electronic information signal for

the select plurality of pixels containing the one pixel" means that the transfer function is selected

28

based on the input pixel value and the average that was formed using the input pixel value. This has to be an average of "x" values, one of which is the input pixel.

A low pass filter cannot perform this claimed averaging because a low pass filter would require that each input pixel value is part of multiple averages. This would cause the language "the average electronic information signal for the select plurality of pixels containing said one pixel" to be violated, and the construction would not be correct. To avoid such a result, Hewlett-Packard includes "where each input pixel is part of only one average" in the construction which is supported by the disclosed "block" average. *See Phillips*, 415 F.3d at 1314 ("[T]he context in which a term is used in the asserted claim can be highly instructive").

Polaroid's construction contradicts the plain language and the specification in that it allows for the pixel information to be a "color, luminance, or chrominance value for one pixel" where the specification discloses transfer functions acting on luminance, not color or chrominance. It also substitutes "calculated intermediate value" for the word "averaging" in the claim, which is inconsistent with the words of the claim and completely unsupported in the specification and should be rejected.

G.   **"A select proportionate value of the dynamic range of the electronic information signals" (claim 7)**

Claim Term	HP Proposed Constr.	Polaroid Proposed Constr.
a select proportionate value of the dynamic range of the electronic information signals	any value within the determinate dynamic range of values, selected depending on where the least image enhancement is desired	value within the range of possible values
Support for HP Position: The select proportionate value is defined in the specification.		
Why Polaroid Position is Incorrect: Polaroid's construction is inconsistent with the specification.		

The parties agree that "a select proportionate value of the dynamic range of the electronic information signals" refers to a value within the dynamic range, but the constructions differ in two ways. First, reflecting the parties disagreement over the preamble term "each signal having

a value within a determinate dynamic range of values," Hewlett-Packard's construction is

limited to the specific number of values within the dynamic range, i.e. integer values within the

dynamic range. Polaroid's construction, on the other hand, would allow any value within the

boundaries of the dynamic range end points, an infinite range of values that lie outside the actual

dynamic range. Second, reflecting the express language of the patent, Hewlett-Packard's

construction incorporates the limitation that the value must be "selected depending on where the

least image enhancement is desired." Polaroid's construction ignores the term "select" and

permits any value to be utilized, which is contrary to the specification.

In the art, the dynamic range represents the scope of possible luminance values that are

expressed in a given image or are capable of being expressed in a given medium. (J.A. at 8 ('381

(col. 1, ll. 30-35) ("The wide dynamic range of luminance intensities within the scene originally

recorded may thus be compressed or clipped to the substantially smaller dynamic range of the photo-

graphic print").) And, for the most part, the '381 patent seems to have used this definition: "The

analog luminance electronic information signal values for each pixel... are digitized to an 8-bit

binary number so as to have a dynamic integer range of from $0 - 255$ within which range are 256

intensity levels and a maximum luminance value of $Y_{MAX}=255$." (J.A. at 8 ('381, col. 3, ll. 43-49).)

However, this common definition does not work, because one can not divide the average

by a range of numbers. One must divide the average by a specific number. A specific number is

outside the typical meaning of "dynamic range", but the specification provides some guidance

when describing M from the ratio A_v/M.[9]

> M for this example is selected to be the center value of the dynamic range of the electronic
> information signals. As was previously stated, the electronic signal values for this example
> comprise 8-bit binary numbers having a dynamic range of 256. Thus, for this example,
> M=128. However, it will be readily understood that M may be selected to be any value

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[9] A_v is the average electronic information signal. M is the select proportionate value of the
     dynamic range. (J.A. at 9 ('381, col. 4, ll. 26-50).)

within the dynamic range of the electronic information signals depending upon where the least image enhancement is desired. (J.A. at 9 ('381, col. 4, ll. 34-43).)

Hewlett-Packard's construction flows directly from this language. In the 8-bit context, a "select proportionate value..." is limited to the value within the set of values consisting of 256 values (0,1,2 . . . 255). When the passage describes the possible values of M, the patent indicates that M must be "within the dynamic range". As noted *supra*, in column 3, the dynamic range is "a dynamic integer range". (J.A. at 9 ('381, col. 3, ll. 43-49).) Furthermore, the exemplary embodiment chooses M to be "the center value of the dynamic range". Basic arithmetic shows that the center value of the range 0 – 255 is 127.5, not 127. Nonetheless, the example chooses the closest integer value because fractional values are not within the dynamic range.

Additionally, Hewlett-Packard's construction is necessary because the file history prevents a reading of the claim in which M can be any value within the dynamic range with no other restrictions. To overcome the obviousness rejection, the applicant added a limitation requiring that the transfer function be selected as a function of the "ratio of the value of the average electronic information signal to a select proportionate value of the dynamic range . . . ". (J.A. at 58.) However, the rejected claim already required that the transfer function be selected as a function of A_v. (J.A. at 29 & 32.) Therefore, M cannot be given a construction that makes A_v/M trivially indistinguishable from A_v.

If M is construed to be <u>any</u> value within the dynamic range, M could be the number 1. A_v divided by 1 <u>is</u> A_v, which would render the new ratio limitation completely redundant. Even if M is some other value, the lack of any substantive meaning renders the A_v/M ratio only trivially different from the rejected claim.

Hewlett-Packard's construction gives the "select proportionate value..." the only substantive meaning suggested by the text. Requiring that M be chosen "depending upon where the least

image enhancement is desired" breathes meaning into the "selected" limitation and is a necessary

construction in light of the prosecution history. Polaroid's construction eliminates the substantive

meaning of a limitation which was necessary for issuance and, therefore, cannot be correct.

H.   "Transforming" (Claim 7).

Claim Term	HP Proposed Constr.	Polaroid Proposed Constr.
transforming the electronic information signal corresponding to each pixel by the transfer function selected for that pixel wherein said transfer function is selected further as a function of the ratio of the value of the average electronic information signal to a select proportionate value of the dynamic range of the electronic information signals such that the ratio increases in correspondence with the increase in the value of the average electronic information signal.	each input pixel value that has been part of the averaging step is altered based on the corresponding average electronic information signal to which it is associated and based on the result of dividing a first existing data value representing the average electronic information signal by a second existing data value representing a select proportionate value of the dynamic range of the average electronic information signals.	transforming the signal providing pixel information, such as a color, luminance, or chrominance value corresponding to each pixel by the transfer function selected for that pixel wherein said transfer function is selected further as a function of the ratio of that calculated intermediate value over a value that lies within a range bounded by definite limits such that the ratio increases in correspondence with the increase in the value of the calculated intermediate value"
Support for HP Position: The select proportionate value is defined in the specification.		
Why Polaroid Position is Incorrect: Polaroid's construction is inconsistent with the specification.		

Hewlett-Packard's construction of the "transforming" step is guided by the plain meaning

of the claim, the prosecution history and the specification. The phrase "transforming the

electronic information signal corresponding to each pixel by the transfer function selected for

that pixel wherein said transfer function is selected further as a function of the ratio of the value

of the average electronic information signal. . ." means that the "electronic information signal

corresponding to each pixel"—the same luminance value for that pixel that was averaged—is

transformed. These are the same "electronic information signals" that are recited earlier in the

step of "averaging the electronic information signals corresponding to selected pluralities of

pixels. . . ." Thus, the same individual pixel luminance values that were involved in the

averaging were transformed, and this is reflected in Hewlett-Packard's construction: "each input

32

pixel value that has been part of the averaging step is altered based on the corresponding average electronic information signal to which it is associated. . . ." The only disclosure in the '381 patent is that the same signals that are averaged are also transformed, and the claims use "the" to refer to the fact that averaging and transforming happens to the same signals. *NTP, Inc. v. Research in Motion, Ltd.*, 418 F.3d 1282, 1306 (Fed. Cir. 2005) (finding that the use of the definite article "the" refers to the prior antecedent use of a claim term or phrase); (*see* J.A. at 6-7 ('381, Figs. 1 & 4) (luminance Y both averaged and transformed).)

The remaining claim phrase "wherein said transfer function is selected further as a function of the ratio of the value of the average electronic information signal to a select proportionate value of the dynamic range of the electronic information signals" means that the transfer function is selected using a ratio. The ratio is defined as the average divided by the select proportionate value of the dynamic range. A ratio is one existing number divided by another existing number, which is reflected in Hewlett-Packard's construction: "the result of dividing a first existing data value representing the average electronic information signal by a second existing data value representing a select proportionate value of the dynamic range of the average electronic information signals." This is supported by the specification, which discloses A_v/M, or the average, divided by 128 in the example of col. 4, ll. 25-45. (J.A. at 9.)

Polaroid's construction is deficient because it allows for any information to be transformed, even if it is different from "the electronic information signal" in the earlier averaging step. For example, there is no disclosure of averaging the chrominance and transforming the luminance, so the PTO could not have granted a claim on such a system. Yet Polaroid's construction seeks to cover this exact situation because it would allow "color, luminance or chrominance" to be used interchangeably in the averaging and transferring steps.

I.   "Means for Selecting . . . and for subsequently transforming" (claim 1)

Claim Term	HP Proposed Constr.	Polaroid Proposed Constr.
means for selecting one of a plurality of different transfer functions for the electronic information signal for each of the succeeding pixels in a manner whereby each transfer function is selected as a function of the electronic information signal for one pixel and the average electronic information signal for the select plurality of pixels containing said one pixel and for subsequently transforming the electronic information signal corresponding to each pixel by the transfer function selected for that pixel wherein said selecting and transforming means further operates to select said transfer function as a function of the ratio of the value of the average electronic information signal to the dynamic range of the electronic information signals such that the ratio increases in correspondence with the increase in the value of the	**Function:** selecting a transfer function for each incoming pixel based on the pixel value and its corresponding average electronic information signal, and based on the result of dividing a first existing data value representing the average electronic information signal by a second existing data value representing the dynamic range of the average electronic information signals. **Disclosed Structure: none** (*indefinite*), alternatively: a gamma determining circuit 14 containing a multiplier circuit 18, a combining circuit 20, a second combiner circuit 22, a log circuit 24, a multiplier circuit 26 and a antilogarithmic determining circuit 28 – all arranged according to Fig 4, which computes gamma based on the formula $\gamma = (1 + C)^{(A_v/M-1)}$, where A_v is average luminance of the input, C is a constant and M equals one half of the dynamic range. and the transfer function imposing circuit 16 containing a logarithm determining circuit 30, a combiner circuit 32, a multiplier circuit 34, a second combiner circuit 36 and an antilogarithm determining circuit 38 – all arranged according to Fig 4, which computes an output luminance: $Y_{Out} = Y_{Max}(Y_{In}/Y_{Max})^{\gamma}$, where Y_{Out} is the output luminance value, Y_{Max} is the	The function of this means-plus-function element is selecting one of a plurality of different transfer functions for the electronic information signal for each of the succeeding pixels and for subsequently transforming the electronic information signal corresponding to each pixel by the transfer function selected for that pixel wherein said selecting and transforming means further operates to select said transfer function as a function of the ratio of the value of the average electronic information signal to the dynamic range of the electronic information signals such that the ratio increases in correspondence with the increase in the value of the average electronic information signal. The terms used to describe the function should be construed as: "transfer function" should be construed to mean "function that transforms an input signal." "electronic information signal" should be construed to mean "signal providing pixel information, such as a color, luminance, or chrominance value." "ratio of the value of the average electronic information signal to the dynamic range of the electronic information signals" should be construed as "ratio of that calculated intermediate value over a value that lies within the range of possible values." "average electronic information signal" should be construed to mean "signal providing pixel information, such as a color, luminance, or chrominance value of calculated intermediate value." The corresponding structure is an algorithm Yout = YMAX(Yin/YMAX)γ, where γ = (1 + C)(Av/M - 1), where Yout is the transformed signal providing pixel information, such as a color, luminance, or chrominance value, YMAX is the highest value of the dynamic range, Yin is the input

34

average electronic information signal	maximum value in the dynamic range (255), Y_{In} is the input pixel value, and γ is the "means for selecting a transfer function" and equivalents.	signal providing pixel information, such as a color, luminance, or chrominance value, C is a chosen number, Av is a calculated intermediate value, and M is any value within the dynamic range, and equivalents thereof.

The parties agree that a construction under the "means plus function" provisions of 35

U.S.C. 112 ¶ 6 applies to this claim term.   The lengthy function is directly recited:

> selecting one of a plurality of different transfer functions for the electronic information signal for each of the succeeding pixels in a manner <u>whereby each transfer function is selected as a function of the electronic information signal for one pixel and the average electronic information signal for the select plurality of pixels containing said one pixel</u> and for subsequently transforming the electronic information signal corresponding to each pixel by the transfer function selected for that pixel wherein said selecting and transforming means further operates to select said transfer function as a function of the ratio of the value of the average electronic information signal to the dynamic range of the electronic information signals such that the ratio increases in correspondence with the increase in the value of the average electronic information signal

(emphasis added.)

1.   The Term is Indefinite

The primary function described is to select a transfer function "as a function" of the

electronic information signal for one pixel (for which there is no disclosure) and the average for

the plurality of pixels containing said one pixel (the block average). The specification describes

selecting a transfer function gamma (γ) based on the block average, but fails to disclose any

structure for selecting a transfer function "as a function" of the electronic information signal for

one pixel." Rather the transfer function that is disclosed is gamma, shown conceptually in box

14 of Figure 1 and structurally in box 14 of Figure 4. No input pixel value is used to select the

transfer function, except as part of the average. This is confirmed by dependent claims 4 and 10

where the equation of gamma is recited as $\gamma = (1+C)^{(Av/M-1)}$.[10] Instead the only disclosed

structure is to select a transfer function based on the average and constants "C" and "M".

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[10] Although the text of the specification of the '381 patent recites this equation as "$\gamma = (1+C)$ (Av/M-1)", (J.A. at 9 ('381, col. 4, ll.63-65), Figure 1 makes it clear that this is a typographical error and the proper recitation of the equation is $\gamma = (1+C)^{(Av/M-1)}$. (J.A. at 6 ('381, Fig. 1).)

The claim language further requires that the selecting means select "as a function of the ratio of the value of the average electronic information signal to the dynamic range of the electronic information signals". The disclosure indicates a ratio of A_v/M is computed where M is 128 and the dynamic range is 256. (J.A. at 9 ('381, col. 3, ll. 30-40).) There is no disclosure of dividing A_v by the dynamic range of 256.

2.   Alternatively, the Structure is Limited to Figure 4

The only disclosed structure is Figure 4, which is inconsistent with the claimed functions. Figure 4 shows a transfer function gamma based on an average Av and constants C and M, in a log/antilog/ multiplier/ ... circuit having the hardware shown within box 14. Since the specification discloses no structure to carry out the disclosed function (for the reasons above), the claim term cannot be construed by reference to associated structure and is therefore indefinite. Should the Court wish to construe the claim in reference to a structure that is actually disclosed, the structure is shown in box 14 of Figure 4 and recited in Hewlett-Packard's alternative construction.

Polaroid's construction is incorrect in that it does not encompass the structure of Figure 4. Instead, it generally cites the equations of Figure 1, which the specification indicates is just a block diagram showing relationships, not structure.

> Thus, in this manner, gamma is determined continuously in accordance with the relationship as shown by the block diagram of FIG. 1 in a simple and convenient manner utilizing multiplication circuits, combining circuits, logarithm determining circuits, and antilogarithm determining circuits as shown in FIG. 4.

> (J.A. at 11 ('381, col. 7, ll. 27-33).)

The block diagram of Figure 1 is not structure, it is conceptual showing a "relationship" revealing the idea behind the structure of Figure 4. Such a diagram is insufficient to qualify as corresponding structure under Federal Circuit law. See *Med. Instrumentation & Diagnostics Corp. v. Elekta AB*, 344 F.3d 1205, 1211 (Fed. Cir. 2003) (reversing a district court construction for improperly identifying a software algorithm as structure when only circuitry was disclosed);

Faroudja Lab., Inc. v. Dwin Elecs., Inc., 76 F. Supp. 2d 999, 1012 (N.D. Cal. 1999) ("Diagrams which do not depict any internal circuitry... cannot be properly identified as the corresponding structure in a means-plus-function element."). Polaroid does not point to the corresponding structure, rather it points to an abstract concept. This is not sufficient for a "means plus function" claim. As such, there is no corresponding structure disclosed relating to this function as required and Polaroid's proposed construction must be rejected.

3. "Dynamic range of the electronic information signals" and "ratio of the value of the average ..." (claim 1)

Claim Term	HP Proposed Constr.	Polaroid Proposed Constr.
Dynamic range of the electronic information signals	an integer representing the number of possible pixel values; for an 8-bit system, 256	value that lies within the range of possible values
ratio of the value of the average electronic information signal to the dynamic range of the electronic information signals	*No construction necessary.* Alternatively: the result of dividing a first existing data value representing the average electronic information signal by a second existing data value representing the dynamic range of the average electronic information signals	ratio of that calculated intermediate value over a value that lies within the range of possible values
Support for HP Position: Specification and ordinary meaning **Why Polaroid Position is Incorrect:** Leads to infinite dynamic range and contrary to ordinary meaning.		

Claim 1 requires that a ratio is computed based on a "ratio of the value of the average electronic information signal to the dynamic range of the electronic information signals." The specification speaks directly to the term used by claim 1 when it describes the ratio: "[T]he electronic signal values for this example comprise 8-bit binary numbers having a dynamic range of 256." (J.A. at 9 ('381, col. 4, ll. 37-39.) This is the only point in the specification where the dynamic range is described as a number suitable for division. The only other mention of 256 is the specification's note that 8-bit binary numbers generate 256 intensity levels. (J.A. at 9 ('381, col. 3, ll. 43-49).) Therefore, the proper construction of this term is "an integer representing the number of possible pixel values; for an 8-bit system, 256".

In contrast, Polaroid's construction simply ignores the difference between "dynamic range of the electronic information signals" and "select proportionate value of the dynamic range of the electronic information signals". The use of "dynamic range" in claim 1 is different, it refers to the entire range, not a portion of the range (or any portion) as alluded to by Polaroid.

4.   **"Low / lowest / high / highest scene light intensity levels" / "Areas of higher contrast"** (claims 2, 3, 8, 9)

Claim Term	HP Proposed Constr.	Polaroid Proposed Constr.
low scene light intensity levels	indefinite	none
lowest scene light intensity levels	indefinite	None
high scene light intensity levels	indefinite	None
highest scene light intensity levels	indefinite	None
areas of higher contrast	*indefinite*	none
Support for HP Position: Unable to discern where these gradations occur in practice		
Why Polaroid Position is Incorrect: no construction offered		

Dependent claims 2 and 8 use the terms "low scene light intensity values," "lowest scene light intensity values," "high scene light intensity values," and "highest scene light intensity values." Each term is indefinite because each is a terms of degree with no readily ascertainable boundary and fails to apprise one skilled in the art of the scope of the claim. *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1342 (Fed. Cir. 2003) ("A claim is indefinite if, when read in light of the specification, it does not reasonably apprise those skilled in the art of its scope.").

For example, claim 2 recites a means "responsive to an average electronic information signal indicative of low scene light intensity levels for transforming the electronic information signals to provide a higher contrast to those electronic information signals corresponding to pixels having the lowest scene light intensity levels." Certainly "low" and "lowest" should have different meanings. However, the patent specification only generally indicates that: "The slope of the transfer function for gamma=2 decreases significantly at the low end of the dynamic range (A_{in}, A_{out}) thereby providing a lower contrast to those image defining luminance electronic information

signals corresponding to pixels having the lowest scene light intensity levels." (J.A> at 10 ('381, col.. 5, ll. 35-40).) The specification does not describe what is meant by "low" or "lowest."

For "high" and "highest" the patent specification teaches that contrast is also increased, but does not give any explanation of what is meant by "high and "highest."

A person of ordinary skill in the art would not be able to know whether any particular system would fit within these claims, and thus the public is not on notice of what infringes and what does not. *Amgen*, 314 F.3d at 1342. For this reason, the Court should declare the terms and corresponding claims to be indefinite.

5.   "Determined constant" (claims 3, 9)

Claim Term	HP Proposed Constr.	Polaroid Proposed Constr.
wherein said selecting and transforming means further operates to select said transfer function as a function of a **determined constant** whose value corresponds to the amount of contrast provided in those areas of higher contrast provided by said select transfer function.	a control parameter	To the extent the court deems a construction necessary, "determined constant" should be construed to mean "chosen number."
Support for HP Position: Specification and ordinary meaning **Why Polaroid Position is Incorrect**: Leads to infinite dynamic range and contrary to ordinary meaning.		

Dependent claims 3 and 9 recite an additional limitation drawn to a "constant whose value corresponds to the amount of contrast provided in those areas of higher contrast...." The specification describes this as "C [,] a control parameter selected in the manner of this invention to vary the amount of image enhancement...." (J.A. at 9 ('381, col. 4, ll. 51-52).) This is also shown as "C" going into box 14 of Figure 3. (*See also* J.A. at 10 ('381, col. 5, l. 16 – col. 6, l. 13).) Thus, "C" controls the amount of contrast and is a "control parameter," as the patentee expressly state in the specification.

IV.   CONCLUSION

For the reasons above, Hewlett-Packard's constructions should be adopted.

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CERTIFICATE OF SERVICE

I hereby certify that on January 18, 2008, I electronically filed with the Clerk of Court the foregoing redacted version of **DEFENDANT HEWLETT-PACKARD COMPANY'S OPENING CLAIM CONSTRUCTION BRIEF** using CM/ECF which will send electronic notification of such filing(s) to the following counsel:

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